

WHAT IS CLAIMED IS:

1. A process for the casting of metals, comprising the steps of:
forming a mold from an aggregate comprising a particulate material and a binder;
delivering a molten metal into said mold;
contacting a solvent with said mold;
cooling said molten metal such that it at least partially solidifies to form a casting; and
removing at least a part of said mold.
2. A process according to claim 1, wherein said binder is water soluble.
3. A process according to claim 2, wherein the step of forming a mold includes adding water to said aggregate and binder.
4. A process according to claim 1, wherein said particulate material comprises pumice, silica sand, or a blend thereof.
5. A process according to claim 4, wherein said particulate material comprises a mixture of said pumice and a silica sand.
6. A process according to claim 1, wherein said particulate material comprises glass, ceramic or refractory hollow spheres.
7. A process according to claim 1, wherein said binder comprises one or more components selected from the group consisting of phosphate glass, inorganic silicates, phosphates, borates, sulfates including magnesium sulfate, organic binders, and mixtures thereof.
8. A process according to claim 1, wherein said mold is cured prior to delivering said molten metal into said mold.

9. A process according to claim 1, wherein said solvent comprises water.
10. A process according to claim 1, further comprising the steps of recovering a removed part of said mold and recovering at least a portion of said solvent.
11. A process according to claim 1, wherein said solvent is delivered to said mold via a nozzle.
12. A process according to claim 1, wherein said mold is permeable to said solvent.
13. A process according to claim 1, wherein said solvent is delivered to said mold at a pressure from 0.03 to 70 bar and in an amount of from 0.5 to 50 liters per second per kg of casting weight per cm of casting section thickness.
14. A process according to claim 1, wherein said solvent contains at least one of a grit and a surfactant.
15. A process according to claim 1, wherein the steps of (i) removing at least a part of said mold and (ii) cooling and at least partially solidifying the molten metal are performed simultaneously.
16. A process according to claim 1, wherein the application of said solvent is continued until the entire mold is removed.
17. A process according to claim 1, wherein the application of said solvent is continued until the entire casting is both cleaned from residual adhering aggregate and sufficiently cool to be conveniently handleable.

18. A process according to claim 1, wherein said steps of (i) contacting a solvent with said mold; (ii) cooling said molten metal such that it at least partially solidifies to form a casting; and (iii) removing at least a part of said mold are performed by lowering said mold into a bath of said solvent.
19. A method for producing a mold having low heat diffusivity, said method comprising the steps of:
- selecting a particulate or granular material;
 - mixing a binder with said particulate or granular material to form a moldable aggregate;
 - filling a pattern with said aggregate to form a mold; and
 - (i) removing said mold in its green state from said pattern and using said mold in its green state for the casting of metal; or
 - (ii) removing said mold in its green state from said pattern and drying said mold or core; or
 - (iii) at least partially drying said mold in the pattern and subsequently removing the mold and completing the drying process separately; or
 - (iv) drying said mold completely in the pattern prior to the removal of the mold or core for use.
20. A method according to claim 19, further comprising the step of compacting said aggregate in said pattern or core box.
21. A method according to claim 19, wherein said step of selecting a particulate or granular material comprises selecting one of silica sand; pumice; cenospheres; ceramic, refractory, or glass microbubbles; and mixtures thereof.
22. A method according to claim 21, wherein said pumice and sand mixture is in a ratio of between 2:1 to 6:1 by volume.

23. A method according to claim 22, wherein said pumice and mixture is in a ratio of about 3:1 by volume.
24. A method according to claim 19, wherein said mold is a two-part mold having a first half and a second half.
25. A mold for the casting of metals comprising an aggregate, said aggregate comprising a particulate or granular material and a soluble binder, wherein said mold may be eroded away using a solvent.
26. A mold according to claim 25, wherein said particulate or granular material comprises a mixture of pumice and sand.
27. A mold according to claim 26, wherein said pumice and sand is present in a ratio of from 2:1 to 6:1 by volume.
28. A mold according to claim 25, wherein said aggregate comprises ceramic, refractory or glass micro-bubbles.
29. A mold according to claim 25, wherein said binder comprises a component selected from the group consisting of phosphate glass, inorganic silicates, phosphates, borates, sulfates, or organic binders, and mixtures thereof.
30. A mold according to claim 25, wherein said mold is permeable to water.
31. A mold according to claim 25, wherein said mold has a lower heat diffusivity than a metal mold.
32. A mold according to claim 25, wherein said particulate or granular material comprises approximately spherical particles.

33. A mold according to claim 25, wherein said aggregate possesses a Mohs hardness of at least 5.
34. A mold according to claim 25, wherein said aggregate is substantially chemically and physically inert at metal molding temperatures.
35. A mold according to claim 25, wherein said mold displays minimal volume change upon heating.
36. A method for forming a casting from a molten metal, comprising the steps of:
 - forming at least a part of a mold from an aggregate comprised of a particulate material and a soluble binder;
 - delivering a molten metal into said mold;
 - contacting said at least a part of said mold with a solvent;
 - removing said at least a part of said mold; and
 - solidifying and cooling at least a part of the molten metal to form a casting.
37. A method according to claim 36, wherein said step of cooling comprises initially freezing a shell of solidifying metal around said molten metal with said solvent.
38. A method according to claim 36, wherein said step of cooling comprises using an already solidified and cooled portion of the casting as a chill to removed heat from a still molten portion of the casting.
39. A method according to claim 36, wherein said solvent comprises water.
40. A method according to claim 36, wherein said particulate material comprises one of silica sand; pumice; cenospheres; ceramic, refractory, or glass microbubbles; and mixtures thereof.

41. A method according to claim 36, wherein said binder comprises a component selected from the group consisting of phosphate glass, inorganic silicates, phosphates, borates, sulfates including magnesium sulfate, organic binders, and mixtures thereof.
42. A method according to claim 36, wherein said steps of (i) contacting said at least a part of said mold with a solvent; (ii) removing said at least a part of said mold; and (iii) solidifying and cooling the molten metal to form a casting are performed by lowering said mold into a bath of said solvent.